FORM PTO-1390
REV. 5-93

US DEPARTMENT OF COMMERCE
PATENT AND TRADEMARK OFFICE

TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371

ATTORNEYS DOCKET NUMBER
P01,0025

U.S. APPLICATION NO. (if known, see 37 CFR 1.5)
09/762607

INTERNATIONAL APPLICATION NO.	INTERNATIONAL FILING DATE	PRIORITY DATE CLAIMED
PCT/DE99/02651	**24 AUGUST 1999**	**31 AUGUST 1998**

TITLE OF INVENTION
TELECOMMUNICATIONS INSTALLATION

APPLICANT(S) FOR DO/EO/US
RÜDIGER ENDRES

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☒ This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay.
4. ☒ A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.

5. ☒ A copy of International Application as filed (35 U.S.C. 371(c)(2)) - drawings attached.
   a. ☒ is transmitted herewith (required only if not transmitted by the International Bureau).
   b. ☐ has been transmitted by the International Bureau.
   c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US)
6. ☒ A translation of the International Application into English (35 U.S.C. 371(c)(2) - drawings attached.

7. ☒ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. §371(c)(3))
   a. ☐ are transmitted herewith (required only if not transmitted by the International Bureau).
   b. ☐ have been transmitted by the International Bureau.
   c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
   d. ☒ have not been made and will not be made.

8. ☐ A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).

9. ☒ An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).

10. ☐ A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

Items 11. to 16. below concern other document(s) or information included:

11. ☐ An Information Disclosure Statement under 37 C.F.R. 1.97 and 1.98; **(PTO 1449, Prior Art, Search Report, References).**

12. ☒ An assignment document for recording. A separate cover sheet in compliance with 37 C.F.R. 3.28 and 3.31 is included. **(SEE ATTACHED ENVELOPE)**

13. ☒ Amendment "A" Prior to Action and Appendix "A".
    ☐ A SECOND or SUBSEQUENT preliminary amendment.

14. ☒ A substitute specification and substitute specification mark-up.

15. ☒ A change of address letter attached to the Declaration.

16. ☒ Other items or information:
    a. ☒ Appointment of Associate Power of Attorney

    b. ☒ ☒ EXPRESS MAIL #EL655302761US dated February 8, 2001

U.S. APPLICATION NO. (if known, see 37 C.F.R. 1.5)	INTERNATIONAL APPLICATION NO.	ATTORNEY'S DOCKET NUMBER
09/762607	PCT/DE99/02651	P01,0025

17. ☒ The following fees are submitted:	CALCULATIONS	PTO USE ONLY
BASIC NATIONAL FEE (37 C.F.R. 1.492(a)(1)-(5): Search Report has been prepared by the EPO or JPO $860.00		
International preliminary examination fee paid to USPTO (37 C.F.R. 1.482) .. $690.00		
No international preliminary examination fee paid to USPTO (37 C.F.R. 1.482) but international search fee paid to USPTO (37 C.F.R. 1.445(a)(2) $710.00		
Neither international preliminary examination fee (37 C.F.R. 1.482) nor international search fee (37 C.F.R. 1.445(a)(2) paid to USPTO $1000.00		
International preliminary examination fee paid to USPTO (37 C.F.R. 1.482) and all claims satisfied provisions of PCT Article 33(2)-(4) ..... $ 100.00		
ENTER APPROPRIATE BASIC FEE AMOUNT =	$ 860.00	
Surcharge of $130.00 for furnishing the oath or declaration later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 C.F.R. 1.492(e)).	$	

Claims	Number Filed		Number Extra	Rate		
Total Claims	13	- 20 =	0	X $ 18.00	$	
Independent Claims	02	- 3 =	0	X $ 80.00	$	
Multiple Dependent Claims				$270.00+	$	
TOTAL OF ABOVE CALCULATIONS =					$ 860.00	
Reduction by ½ for filing by small entity, if applicable. Verified Small Entity statement must also be filed. (Note 37 C.F.R. 1.9, 1.27, 1.28)					$	
SUBTOTAL =					$ 860.00	
Processing fee of $130.00 for furnishing the English translation later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 CFR 1.492(f)). +					$	
TOTAL NATIONAL FEE =					$ 860.00	
Fee for recording the enclosed assignment (37 C.F.R. 1.21(h). The assignment must be accompanied by an appropriate cover sheet (37 C.F.R. 3.28, 3.31). $40.00 per property +						
TOTAL FEES ENCLOSED =					$ 860.00	
					Amount to be refunded	$
					charged	$

a. ☒ A check in the amount of $ 860.00 to cover the above fees is enclosed.

b. ☐ Please charge my Deposit Account No. _____ in the amount of $ _____ to cover the above fees. A duplicate copy of this sheet is enclosed.

c. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 50-1519. **A duplicate copy of this sheet is enclosed.**

NOTE: Where an appropriate time limit under 37 C.F.R. 1.494 or 1.495 has not been met, a petition to revive (37 C.F.R. 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

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BOX PCT
IN THE UNITED STATES DESIGNATED/ELECTED OFFICE
OF THE UNITED STATES PATENT AND TRADEMARK OFFICE
UNDER THE PATENT COOPERATION TREATY--CHAPTER II

PRELIMINARY AMENDMENT A
PRIOR TO ACTION

APPLICANT(S):	RÜDIGER ENDRES
ATTORNEY DOCKET NO.:	P01,0025
INTERNATIONAL APPLICATION NO:	PCT/DE99/02651
INTERNATIONAL FILING DATE:	24 AUGUST 1999
INVENTION:	TELECOMMUNICATIONS INSTALLATION

Assistant Commissioner for Patents,
Washington D.C. 20231

Sir:

Applicants herewith amend the above-referenced PCT application, and request entry of the Amendment prior to examination on the United States Examination Phase.

IN THE CLAIMS:

On page 13:

replace line 1 with --WHAT IS CLAIMED IS:--;

Please replace original claims 1-10 with the following rewritten claims 1-10, referring to the mark-ups in Appendix A.

1. (Amended) A telecommunications installation, comprising:

a control computer to control said telecommunications installation, said control computer comprising:

a memory to store control software and work data, said memory comprising a plurality of memory areas, specific control software being allocated to

each said memory area, and in that said control software of one of said plurality of memory areas is declared to be active control software and said control software of other memory areas is declared to be passive control software, so that said control computer controls said telecommunications installation according to said active control software.

2. (Amended) The telecommunications installation as claimed in claim 1, wherein specific work data, which are stored by said memory, are allocated to each control software package, said work data allocated to said active control software being declared to be active work data and said other work data are declared to be passive work data, so that said control computer controls said telecommunications installation according to said active control software and said active work data.

3. (Amended) The telecommunications installation as claimed in claim 2, wherein said memory comprises two memory areas to which specific control software and specific work data are in each case allocated.

4. (Amended) The telecommunications installation as claimed in claim 3, wherein said two memory areas comprise identical control software and identical work data, and, in the event of a fault during control of said telecommunications installation, said control computer switches over to and activates previously passive control software and previously passive work data and deactivates said previously active control software and said previously active work data, in order to subsequently control said telecommunications installations according to newly activated control software and newly activated work data.

5. (Amended) The telecommunications installation as claimed in claim 4, wherein, in the event of a fault during said control of the telecommunications installation, and by way of a menu-driven operating intervention, said control computer switches over to and activates said previously passive control software

and said previously passive work data and deactivates said previously active control software and said previously active work data.

6. (Amended) The telecommunications installation as claimed in claim 4, wherein, in the event of a fault during said control of said telecommunications installation, said control computer temporarily transfers to a pause condition before switching over to said previously passive control software and said previously passive work data.

7. (Amended) The telecommunications installation as claimed in claim 3, wherein, during re-installation of control software, said control computer continues to control said telecommunications installation according to said active control software.

8. (Amended) The telecommunications installation as claimed in claim 3, wherein, during re-installation of work data, said control computer temporarily switches to said passive memory area containing said passive control software, in order to install a new work database therein.

9. (Amended) The telecommunications installation as claimed in claim 3, wherein, during a changeover from said active memory area and corresponding control software and corresponding work data to said other memory area and corresponding control software and corresponding work data, said control computer evaluates, with reference to stored control information, whether only said control software or else said work data or else a further control computer are affected by said changeover and, depending on this evaluation, automatically initiates a restoration of said telecommunications installation.

10. (Amended) The telecommunications installation as claimed in claim 2, wherein said control computer comprises an input device to enter control information

which declares control software and work data of individual memory areas of said memory to be either active or passive.

Please add the following new claims 11-13.

11. (New) A method for operating a telecommunications installation comprising a control computer, comprising the steps of:

storing control software in a repetitive redundant manner into different memory areas of a memory within said control computer;

declaring controlled software of one memory area as an active control software;

declaring control software of other memory areas as passive control software; and

controlling said telecommunications installation by said control computer from said active control software.

12. (New) The method according to claim 11, further comprising the steps of:

storing work data in a repetitive redundant manner into said memory;

allocating specific work data to each control software;

declaring work data allocated to said active control software as active work data; and

declaring work data being allocated to said passive control software as passive work data;

said step of controlling said telecommunications installation further comprising the step of controlling said telecommunication installation from said active work data.

13. (New) The method according to claim 12, further comprising the steps of, in the event of a fault during control of said telecommunications installation,:

activating said passive control software and said passive work data, respectively creating newly active control software and work data;

deactivating said active control software and said active work data,

respectively creating newly passive control software and work data; and

controlling said telecommunications installation by said control computer from said newly active control software and said newly active work data.

REMARKS

The present Amendment revises the specification and claims to conform to United States patent practice, before examination of the present PCT application in the United States National Examination Phase. Pursuant to 37 CFR 1.125 (b), applicants have concurrently submitted a substitute specification, excluding the claims, and provided a marked-up copy. All of the changes are editorial and applicant believes no new matter is added thereby. The amendment, addition, and/or cancellation of claims is not intended to be a surrender of any of the subject matter of those claims.

Early examination on the merits is respectfully requested.

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Appendix A
Mark Ups for Claim Amendments

This redlined draft, generated by CompareRite (TM) - The Instant Redliner, shows the differences between -
original document : Q:\DOCUMENTS\YEAR 2001\P010025-ENDRES-TELECOM INSTALLATION\ORIGINAL CLAIMS.DOC
and revised document: Q:\DOCUMENTS\YEAR 2001\P010025-ENDRES-TELECOM INSTALLATION\AMENDED CLAIMS.DOC

CompareRite found 137 change(s) in the text

Deletions appear as Overstrike text surrounded by []
Additions appear as Bold-Underline text

1. **(Amended)** A telecommunications installation~~[(1),]~~, **comprising:**

~~[with at least one]~~ **a** control computer ~~[(6a, 6b)]~~ to control ~~[the]~~ **said** telecommunications installation**, said**~~[(1), in which the]~~ control computer ~~[(6a, 6b) has]~~ **comprising:**

a memory ~~[means (7a, 7b, 24)]~~ to store control software ~~[(APS1, APS2)]~~ and work data**, said memory comprising**~~[(DB1, DB2), characterized in that the memory means (7a, 7b, 24) comprise]~~ a plurality of memory areas~~[(19, 20)]~~, specific control software ~~[(APS1, APS2)]~~ being allocated to each **said** memory area~~[(19, 20)]~~, and in that ~~[the]~~ **said** control software ~~[(APS1, APS2)]~~ of one of ~~[these]~~ **said plurality of** memory areas ~~[(19, 20)]~~ is declared to be active **control software** and ~~[the]~~ **said** control software of ~~[the]~~ other memory areas is declared to be passive **control software**, so that ~~[the]~~ **said** control computer ~~[(6a, 6b)]~~ controls ~~[the]~~ **said** telecommunications installation ~~[(1)]~~ according to ~~[the]~~ **said** active control software~~[(APS1, APS2)]~~.

2. **(Amended)** The telecommunications installation as claimed in claim 1, **wherein** ~~[characterized in that]~~ specific work data~~[(DB1, DB2)]~~, which are stored by ~~[the]~~ **said** memory ~~[means (7a, 7b, 24)]~~, are allocated to each control software package**, said**~~[(APS1, APS2),~~

~~the~~] work data [~~(DB1, DB2)~~] allocated to [~~the~~] **said** active control software [~~(APS1, APS2) are~~] **being** declared to be active **work data** and [~~the~~] **said** other work data are declared to be passive **work data**, so that [~~the~~] **said** control computer [~~(6a, 6b)~~] controls [~~the~~] **said** telecommunications installation [~~(1)~~] according to [~~the~~] **said** active control software [~~(APS1, APS2)~~] and [~~the~~] **said** active work data[~~(DB1, DB2)~~].

3. **(Amended)** The telecommunications installation as claimed in claim 2, [~~characterized in that the memory means (7a, 7b, 24) comprise~~] **wherein said memory comprises** two memory areas [~~(19, 20)~~] to which specific control software [~~(APS1, APS2)~~] and specific work data [~~(DB1, DB2)~~] are in each case allocated.

4. **(Amended)** The telecommunications installation as claimed in claim 3, [~~characterized in that the~~] **wherein said** two memory areas [~~(19, 20)~~] comprise [~~the same~~] **identical** control software and [~~the same~~] **identical** work data, [~~wherein~~] **and**, in the event of a fault during [~~the~~] control of [~~the~~] **said** telecommunications installation[~~(1), the~~]**, said** control computer [~~(6a, 6b)~~] switches over to and activates [~~the~~] previously passive control software and [~~the~~] previously passive work data and deactivates [~~the~~] **said** previously active control software and [~~the~~] **said** previously active work data, in order to subsequently control [~~the~~] **said** telecommunications installations according to [~~the~~] newly activated control software and [~~the~~] newly activated work data.

5. **(Amended)** The telecommunications installation as claimed in claim 4, [~~characterized in that~~] **wherein**, in the event of a fault during [~~the~~] **said** control of the telecommunications installation[~~(1)~~], and by [~~means~~] **way** of a menu-driven operating intervention, [~~the~~] **said** control computer [~~(6a, 6b)~~] switches over to and activates [~~the~~] **said** previously passive control software and [~~the~~] **said** previously passive work data and deactivates [~~the~~] **said** previously active control software and [~~the~~] **said** previously active work data.

6. **(Amended)** The telecommunications installation as claimed in claim 4 ~~[or 5, characterized in that]~~**, wherein**, in the event of a fault during ~~[the]~~ **said** control of ~~[the]~~ **said** telecommunications installation~~[(1), the]~~**, said** control computer ~~[(6a, 6b)]~~ temporarily transfers to a pause condition before switching over to ~~[the]~~ **said** previously passive control software and ~~[the]~~ **said** previously passive work data.

7. **(Amended)** The telecommunications installation as claimed in **claim 3, wherein** ~~[one of claims 3-6, characterized in that]~~, during re-installation of control software~~[(APS1, APS2), the]~~**, said** control computer ~~[(6a)]~~ continues to control ~~[the]~~ **said** telecommunications installation ~~[(1)]~~ according to ~~[the]~~ **said** active control software.

8. **(Amended)** The telecommunications installation as claimed in ~~[one of claims 3-7, characterized in that]~~ **claim 3, wherein**, during re-installation of work data, ~~[the]~~ **said** control computer ~~[(6a, 6b)]~~ temporarily switches to ~~[the]~~ **said** passive memory area ~~[(19, 20)]~~ **containing said passive control software**, in order to install a new work database therein.

9. **(Amended)** The telecommunications installation as claimed in **claim 3, wherein** ~~[one of claims 3-8, characterized in that]~~, during a changeover from ~~[the]~~ **said** active memory area ~~[(19)]~~ and ~~[the]~~ corresponding control software ~~[(APS1)]~~ and ~~[the]~~ corresponding work data ~~[(DB1)]~~ to ~~[the]~~ **said** other memory area ~~[(20)]~~ and ~~[the]~~ corresponding control software ~~[(APS2)]~~ and ~~[the]~~ corresponding work data~~[(DB2), the]~~**, said** control computer ~~[(6a, 6b)]~~ evaluates, with reference to stored control information, whether only ~~[the]~~ **said** control software or else ~~[the]~~ **said** work data or else a further control computer ~~[(6c, 6d)]~~ are affected by ~~[this]~~ **said** changeover and, depending on this evaluation, automatically initiates ~~[the]~~ **a** restoration of ~~[the]~~ **said** telecommunications installation~~[(1).]~~**.**

10. **(Amended)** The telecommunications installation as claimed in **claim 2, wherein said** [~~one of claims 2-9, characterized in that~~ the] control computer [~~(6a, 6b)~~] comprises **an** input [~~means (10a, 11a, 10b, 11b)~~] **device** to enter control information which declares [~~the~~] control software [~~(APS1, APS2)~~] and [~~the~~] work data [~~(DB1, DB2)~~] of [~~the~~] individual memory areas [~~(19, 20)~~] of [~~the~~] **said** memory [~~means (7a, 7b, 24)~~] to be either active or passive.

SPECIFICATION JC05 Rec'd PCT/PTO 0 8 FEB 2001

TITLE

TELECOMMUNICATIONS INSTALLATION

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to a telecommunications installation that has at least one control computer to control the telecommunications installation, in which the control computer has a memory to store control software and work data.

Description of the Related Art

Telecommunications installations of this type, for example, those used as node points in ATM communications networks, are program-controlled, i.e., they comprise one or more control computers to control the functions of the telecommunications installation. Control software in the form of an application program system (APS) is implemented on the control computer. Furthermore, the control computer has a database system to store work data which is used together with the application program system to control the telecommunications installation. Along with a control computer of this type for administrative control of the telecommunications installation, an additional control computer is normally provided to control the actual hardware of the telecommunications installation, i.e., to control the switching system. For reasons of security, the control computers described above are preferably provided in duplicate, in order to avoid total failure of the telecommunications installation in the event of failure of one control computer, via this redundancy thus created.

During the operation of an application program system, destruction of the system software, i.e., the APS file system, or inconsistencies in the databases implemented on the control computers may arise, for example, due to hardware or software faults or as a result of voltage failure or incorrect operation, which cannot be cleared even by means of the previously mentioned redundancy resulting from the duplication of the control computers. Faults may also occur when an application

program system is changed due to incorrect operation or hardware/software problems, which could result in database corruption.

In the event of faults of this type, the application program system, for example, that had been backed up on a magnetic tape, previously had to be loaded into the telecommunications installation again and therefore restored. In the event of database destruction, the database had to be reinitialized and the previously existing connections running via the corresponding telecommunications installation had to be reloaded, for example, with the aid of a batch file. An at least temporary failure of the connections was then inevitable.

In addition to the previously mentioned problems in the event of faults in the APS file system or database of a control computer, known telecommunications installations were also disadvantageous in that, during a test system operation of the relevant telecommunications installation in the event of a test level changeover, a major database modification was often required, which could be relatively time-consuming.

SUMMARY OF THE INVENTION

The present invention is therefore based on the object of producing a telecommunications installation which enables simpler and, in particular, faster changeover of the software of one application program system to the software of another application program system, which is required, for example, if faults occur in the file system of the active application program system. In addition, the present invention is preferably intended to enable simpler test system operation of the telecommunications installation and simpler clearance of faults in the active database of the control computer of the telecommunications installation.

The previously mentioned object is achieved according to the present invention by a telecommunications installation comprising: a control computer to control said telecommunications installation, said control computer comprising: a memory to store control software and work data, said memory comprising a plurality of memory areas, specific control software being allocated to each said memory area, and in that said control software of one of said plurality of memory areas is

declared to be active control software and said control software of other memory areas is declared to be passive control software, so that said control computer controls said telecommunications installation according to said active control software. In the telecommunications installation, specific work data, which are stored by said memory, may be allocated to each control software package, said work data allocated to said active control software being declared to be active work data and said other work data are declared to be passive work data, so that said control computer controls said telecommunications installation according to said active control software and said active work data. The memory may comprise two memory areas to which specific control software and specific work data are in each case allocated. In the invention the two memory areas may comprise identical control software and identical work data, and, in the event of a fault during control of said telecommunications installation, said control computer switches over to and activates previously passive control software and previously passive work data and deactivates said previously active control software and said previously active work data, in order to subsequently control said telecommunications installations according to newly activated control software and newly activated work data. In the event of a fault during said control of the telecommunications installation, and by way of a menu-driven operating intervention, said control computer may switch over to and activate said previously passive control software and said previously passive work data and deactivate said previously active control software and said previously active work data. In the event of a fault during said control of said telecommunications installation, said control computer temporarily can transfer to a pause condition before switching over to said previously passive control software and said previously passive work data. During re-installation of control software, said control computer may continue to control said telecommunications installation according to said active control software; or may temporarily switches to said passive memory area containing said passive control software, in order to install a new work database therein. During a changeover from said active memory area and corresponding control software and corresponding work data to said other memory area and corresponding control software and corresponding work data, said control

computer may evaluate, with reference to stored control information, whether only said control software or else said work data or else a further control computer are affected by said changeover and, depending on this evaluation, automatically initiate a restoration of said telecommunications installation. Finally, in the inventive telecommunications installation, the control computer may comprise an input device to enter control information which declares control software and work data of individual memory areas of said memory to be either active or passive. The invention is explained in more detail below.

According to the present invention, the control computer comprises a plurality of application program systems (APS file systems), which, for example, are set up in different memory areas of the hard disk of the control computer of the telecommunications installation. Only one of these APS file systems is set to be active during a re-installation or changeover of the application program system, while the other APS file systems are declared to be passive. The telecommunications installation is then controlled according to the APS file system which is declared to be active. The switchover from one APS file system to another is simply performed in that the currently active APS file system becomes passive and one of the currently passive APS file systems becomes active.

A corresponding database for work data is advantageously connected to each APS file system. According to the preferred exemplary embodiment, in particular, two pairs of APS file systems/databases are set up on the control computer. The active APS file system and the active database are set up via a special mechanism to start up the telecommunications installation, while the other APS file system and the other database are declared to be passive. The telecommunications installation is then controlled by the control computer on the basis of the active APS file system or corresponding APS software and the work data of the active database. In this way, the disk memory capacity of the control computer is effectively used through declaration of an active and a passive half in order to enable faster changeover between the installed APS file systems or corresponding databases, where, in particular, a fallback position can be created for possible emergencies by transferring a copy of the active APS file system and the

active database to the initially passive memory area of the control computer in such a way that, even if the redundant control computer is unavailable in the event of a fault, operation of the telecommunications installation can be maintained.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention is explained in detail below by way of a preferred exemplary embodiment, with reference to the attached drawing.

Figure 1 is a simplified block diagram of a telecommunications installation according to the present invention, and

Figure 2 is a detailed block diagram of the components illustrated in Figure 1, which serve to control the telecommunications installation.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The telecommunications installation 1 shown in figure 1 serves to switch voice, image, text and data connections between the subscribers of a telecommunications network (particularly an ATM telecommunications network) allocated to the telecommunications installation 1. The telecommunications installation 1 preferably operates digitally, i.e., digital information transmission takes place within the telecommunications installation 1.

The telecommunications installation 1 comprises, as central components, a digital switching network 4, which represents the actual switching equipment of the telecommunications installation 1. The switching network 4 enables "physical translocation" from one transmission line connected to the telecommunications installation 1 to another transmission line, and "temporal translocation" from one transmission channel to another transmission channel. The digital switching network 4 is normally divided up into individual switching network modules or switching stages.

Different subscribers and transmission lines, which are fed via line adapters 2a-2c to the digital switching network, are allocated to the telecommunications installation 1. If required, analog/digital conversion is carried out in the incoming direction and digital/analog conversion is carried out in the outgoing direction in the line adapters

2a-2c. The line adapters 2a-2c may be connected, e.g.,via PCM transmission lines having, for example, 64 channels, to the digital switching network 4. For the sake of simplicity, a plurality of subscriber lines 3 are shown in Figure 1 for the line adapter 2a only; these subscriber lines may be allocated to both analog and digital subscriber terminal devices or further network nodes. The line adapters 2b and 2c are also connected in each case to a multiplicity of subscriber lines 3.

The telecommunications installation 1 is program-controlled. This is done with the aid of a controller 5, which receives the connection requests of the subscribers of the telecommunications installation 1, carries out the routing, and controls the entire telecommunications installation 1, particularly the hardware of the telecommunications installation. As explained in more detail below, the telecommunications installation 1 is controlled according to the application program system (APS), which is implemented on the telecommunications installation 1.

In the example shown in Figure 1, the function of the controller 5 is divided up into two halves, which run on two separate computer systems. One computer system, referred to as PCE, is used for administrative control of the telecommunications installation 1, in such a way that the application program system (APS) essentially runs on this computer system. The second computer system, referred to as GPE, is used primarily to control the actual switching system, i.e., particularly the digital switching network 4, of the telecommunications installation 1. In contrast to the computer system PCE, the computer system GPE is therefore more hardware-oriented and supports the switching system processes.

Both computer systems PCE and GPE are provided in duplicate for security, in order to prevent the entire telecommunications installation 1 from crashing if one computer of the relevant computer system fails. According to the embodiment shown in Figure 1, the computer system PCE therefore comprises two control units PCEU0 and PCEU1, which are formed by the control computers 6a and 6b shown in Figure 1. The computer system GPE analogously comprises two control units GPEU0 and GPEU1, which are formed by the control computers 6c and 6d shown in Figure 1. Within the individual computer systems PCE and GPE, each single control computer can therefore perform the function of the other control computer if the latter fails, in

which case one control computer is operated in an active mode and the other control computer is operated in a standby mode. As explained in more detail below, the computer system PCE provides not only operating functions but also nonvolatile memory media of the telecommunications installation 1 and performs central control functions. The computer system GPE on the other hand has no secondary memories and performs the real-time control functions for the peripherals and for the switching network 4 of the telecommunications installation 1.

Figure 2 shows details of the configuration of the controller 5 shown in Figure 1. The control units PCEU0 and PCEU1 can be implemented with normal personal computers 6a and 6b. A mouse 10a and 10b and/or a keyboard 11a and 11b are available as input media. Hard disks 7a and 7b, disk drives 13a and 13b and/or streamer drives 9a and 9b can be provided in each case as secondary memories. Furthermore, a CD-ROM drive 8a and 8b is in each case provided to enter (i.e., load) software. A monitor 12a and 12b is connected to each control computer 6a, 6b, and a printer 14a and 14b, respectively, is additionally allocated to each control computer.

The two partner control computers 6a, 6b are, for example, interconnected via an Ethernet connection 17. The two control computers 6a and 6b can furthermore be connected via the Ethernet connection 17 to a service multiplexer, via which, for example, lines can be connected according to the E1 transmission standard of the relevant telecommunications installation 1. In the embodiment shown in Figure 2, a V.24 connection 16, which serves to locate faults in the event of possible failure of the Ethernet line 17, is routed in parallel with the Ethernet connection line 17.

In order to be able to communicate, inter alia, with remote workstations, each control computer 6a, 6b has connections 18a and 18b, which are designed in the form of an X.25 connection and are implemented with the aid of a dedicated plug-in card. In addition, interface cards 21a, 21b are provided, via which the control units PCEU0 and PCEU1 can be connected with the aid of corresponding connections 22a and 22b to the control units GPEU0 and GPEU1, which are implemented by the previously mentioned control computers 6c and 6d.

Finally, for synchronization, a remotely controlled clock 15 is also provided, which is preferably connected via V.24 interfaces to the two control computers 6a, 6b. However, a radio clock 15 of this type is provided only in telecommunications installations which are designed as central units.

Finally, the control units GPEU0 and GPEU1 implemented with the control computers 6c, 6d are connected to the switching network 4 shown in Figure 1 and the peripherals of the telecommunications installation 1, and furthermore have connections to output fault messages. Additionally, these two control computers 6c and 6d are interconnected via a link-channel 23 to exchange hardware status messages with one another.

UNIX can be used as the operating system on the control units PCEU0 and PCEU1, and also a user interface based on X-Windows and the OSF-Motif. The ORACLE relational database management system is preferably used for data organization.

With the redundancy implemented with the control computers 6a and 6b, and 6c and 6d, only one of the control computer pairs 6a and 6b, and 6c and 6d, is active, while the other of the relevant control systems PCE and GPE is in standby mode. Only a restricted, rather than the complete, command scope (e.g., configuration commands) is offered on the relevant standby control computer, in order to turn the standby computer into the active control unit.

When activated, the two control computers 6a and 6b of the computer system PCE control the telecommunications installation 1 in each case depending on the software of an activated application program system (APS) and the work data of an activated database. This is explained in detail below with reference to the control computer 6a serving as the control unit PCEU0.

As shown in Figure 2, the control computer 6a accesses a specific data stock 24 which comprises the software for the application program system and the database. This data stock 24 is located on the hard disk 7a of the control computer 6a. According to the present invention, the data stock 24 comprises a plurality of APS file systems and preferably also databases, in each case only one pair of APS file systems/databases being activated and the other pairs being deactivated.

According to the preferred exemplary embodiment shown in Figure 2, two pairs of APS file systems/databases are set up, in which one memory area 19 has the software for one APS file system APS1 and the work data for a database DB1, while another memory area 20 comprises the software for a further APS file system APS2 and the memory area for a further database DB2. The APS file system APS1, along with the database DB1, forms an associated pair, whereas the APS file system APS2, along with the database DB2, likewise forms a corresponding pair. Alternatively, situations are also possible in which the two APS file systems APS1 and APS2 interwork with the same database DB1 or DB2. This may arise following an APS changeover without modifying the database functionality on economic and time-saving grounds.

The relevant active APS file system and the active database are set in each case in the control computer 6a by way of corresponding control information via a special mechanism in the event of a re-installation or changeover of the application program system or a changeover between different application program systems. The exemplary embodiment shown in Figure 2 assumes that the APS file system APS1 is initially set as the active APS file system and the database DB1 is set as the active database.

With the aid of the configuration shown in Figure 2, a simple APS changeover can be carried out accordingly by deactivating the APS file system APS1 and by activating the other APS file system APS2. A simple database changeover can be correspondingly implemented by deactivating the database DB1 and by activating the database DB2. An APS changeover of this type is appropriate particularly in the event of operational disruption, if no correct control of the telecommunications installation 1 can be implemented with the aid of the initially active APS file system APS1. However, in the case of an APS changeover of this type, the computer 6a must temporarily assume an undo or pause setting in order to avoid an overlap of the active and passive positions of the individual APS file systems or databases.

During periods of little or no operation, a fallback position can be very simply created for the control computer 6a by copying the contents of the initially active memory area 19 into the passive memory area 20 in such a way that the passive

APS file system APS2 corresponds to the active APS file system APS1 and the passive database DB2 corresponds to the active database DB1, in order to guarantee reliable control of the telecommunications installation in a possible emergency, even if the redundant PCE control computer 6b is unavailable, by changing over to the memory area 20 with the APS file system APS2 and the database DB2.

During the installation of an application program system, the application program system which is still active remains active. Only if a database changeover is required during installation is there a need for a temporary changeover to the passive database (in the example shown in Figure 2, to the database DB2) in order to initialize a new database there and start the data transfer.

In terms of an APS changeover, a distinction is made between different types of a changeover of this type. Thus, for example, only the APS file system may be affected by a changeover of the application program system, so that, in this case, only the currently active APS file system is shut down and the new APS file system needs to be started up. If, on the other hand, the database memory area is also affected, the old database must also be shut down and the new database started up. In addition, the entire control computer is fully rebooted. The GPE control computer may equally be affected by an APS changeover, so that, in this case, the GPE control units GPEU0 and GPEU1 must also be re-initialized if required. In order to control these different cases of APS changeovers, a specific restore or recovery stage must be allocated to each APS changeover, and is stored in the control computer 6a in the form of corresponding control information. With the occurrence of an APS changeover, the control computer 6a can determine and apply the relevant recovery stage with the aid of this control information, in order to carry out the controller restoration as effectively as possible in this way. The redundancy requirements must essentially be observed here, i.e., the relevant APS file system/database pairing must match, the active control computer remains active and the control computer in standby mode must be shut down to prevent interference with the controller.

It is evident from the above description that, according to the present invention, only one APS file system/database pair is active. The other, initially passive, pair can be accessed, for example, via a fallback mechanism in the event of an emergency via the active application program system or, for example, in test system operation in the event of a test level changeover, via the application program system of the preceding test layer, in order to activate this APS file system/database pair.

In the exemplary embodiment shown in Figure 2, only two pairs of APS file systems/databases are set up. However, the present invention can be applied to more than two such pairs, in which case it must be guaranteed that only one of these pairs is activated and the other pairs are deactivated. Furthermore, the controller has been explained with reference to Figure 2 purely in terms of the control computer 6a, i.e., in terms of the PCEU0 control unit. However, the above description also applies analogously to the redundant control computer 6b, i.e., the PCEU1 control unit, in which case a plurality of pairs of APS file systems/databases are likewise advantageously set up and only one of these pairs is activated.

With the aid of the present invention, the capacity of the hard disk of a control computer 6a, 6b can be effectively used in order to quickly carry out an APS changeover and switch over to a new APS. This is particularly advantageous in the event of a test level changeover in test system operation of the telecommunications installation 1. Furthermore, this is advantageous in the event of an emergency, in order to guarantee reliable control of the telecommunications installation by way of an APS changeover even if the redundant control computer is unavailable.

The above-described telecommunication installation is illustrative of the principles of the present invention. Numerous modifications and adaptations thereof will be readily apparent to those skilled in this art without departing from the spirit and scope of the present invention.

ABSTRACT

A telecommunications installation (1) is provided, which is controlled with the aid of at least one control computer (6a, 6b), in which the control computer (6a, 6b) stores control software (APS1, APS2) and work data (DB1, DB2) for controlling the telecommunications installation (1). A plurality of pairs of control software and work data (APSi; DBi) are set up, where only one of these pairs is set to be active and the other pairs are set to be passive for controlling the telecommunications installation.

Description

Telecommunications installation

The present invention relates to a telecommunications installation according to the preamble of claim 1.

Telecommunications installations of this type, for example those used as node points in ATM communications networks, are program-controlled, i.e. they comprise one or more control computers to control the functions of the telecommunications installation. Control software in the form of an application program system (APS) is implemented on the control computer. Furthermore, the control computer has a database system to store work data which is used together with the application program system to control the telecommunications installation. Along with a control computer of this type for administrative control of the telecommunications installation, an additional control computer is normally provided to control the actual hardware of the telecommunications installation, i.e. to control the switching system. For reasons of security, the control computers described above are preferably provided in duplicate, in order to avoid total failure of the telecommunications installation, in the event of failure of one control computer, by means of the redundancy thus created.

During the operation of an application program system, destruction of the system software, i.e. the APS file system, or inconsistencies in the databases implemented on the control computers may arise, for example due to hardware or software faults or as a result of voltage failure or incorrect operation, which cannot be cleared even by means of the aforementioned redundancy resulting from the duplication of the control computers. Faults may also occur when an

application program system is changed due to incorrect operation or hardware/software problems, which could result in database corruption.

In the event of faults of this type, the application program system, for example backed up on a magnetic tape, hitherto had to be loaded into the telecommunications installation again and therefore restored. In the event of database destruction, the database had to be reinitialized and the previously existing connections running via the corresponding telecommunications installation had to be reloaded, for example, with the aid of a batch file. An at least temporary failure of the connections was then inevitable.

In addition to the aforementioned problems in the event of faults in the APS file system or database of a control computer, known telecommunications installations were also disadvantageous in that, during a test system operation of the relevant telecommunications installation in the event of a test level changeover, a major database modification was often required, which could be relatively time-consuming.

The present invention is therefore based on the object of producing a telecommunications installation which enables simpler and, in particular, faster changeover of the software of one application program system to the software of another application program system, which is required, for example, if faults occur in the file system of the active application program system. In addition, the present invention is preferably intended to enable simpler test system operation of the telecommunications installation and simpler clearance of faults in the active database of the control computer of the telecommunications installation.

The aforementioned object is achieved according to the present invention by a telecommunications installation with the features of claim 1. The subclaims describe advantageous and preferred

embodiments of the present invention, which in turn contribute to the simplest and

fastest possible changeover of the application program system or corresponding control software.

According to the present invention, the control computer comprises a plurality of application program systems (hereinafter referred to as APS file systems for the sake of simplicity), which, for example, are set up in different memory areas of the hard disk of the control computer of the telecommunications installation. Only one of these APS file systems is set to be active during a re-installation or changeover of the application program system, while the other APS file systems are declared to be passive. The telecommunications installation is then controlled according to the APS file system which is declared to be active. The switchover from one APS file system to another is simply performed in that the currently active APS file system becomes passive and one of the currently passive APS file systems becomes active.

A corresponding database for work data is advantageously connected to each APS file system. According to the preferred exemplary embodiment, in particular two pairs of APS file systems/databases are set up on the control computer. The active APS file system and the active database are set up via a special mechanism to start up the telecommunications installation, while the other APS file system and the other database are declared to be passive. The telecommunications installation is then controlled by the control computer on the basis of the active APS file system or corresponding APS software and the work data of the active database. In this way, the disk memory capacity of the control computer is effectively used through declaration of an active and a passive half in order to enable faster changeover between the installed APS file systems or corresponding databases, whereby in particular a fallback position can be created for possible emergencies by transferring a copy of the active APS file system and the active database

to the initially passive memory area of the control computer in such a way that, even if the redundant control computer is unavailable in the event of a fault, operation of the telecommunications installation can be maintained.

The invention is explained in detail below by means of a preferred exemplary embodiment, with reference to the attached drawing.

Figure 1 shows a simplified block diagram of a telecommunications installation according to the present invention, and

Figure 2 shows a detailed block diagram of the components illustrated in figure 1, which serve to control the telecommunications installation.

The telecommunications installation 1 shown in figure 1 serves to switch voice, image, text and data connections between the subscribers of a telecommunications network, in particular an ATM telecommunications network, allocated to the telecommunications installation 1. The telecommunications installation 1 preferably operates digitally, i.e. digital information transmission takes place within the telecommunications installation 1. The telecommunications installation 1 comprises, as central components, a digital switching network 4, which represents the actual switching equipment of the telecommunications installation 1. The switching network 4 enables "physical translocation" from one transmission line connected to the telecommunications installation 1 to another transmission line, and "temporal translocation" from one transmission channel to another transmission channel. The digital switching network 4 is normally divided up into individual switching network modules or switching stages.

Different subscribers and transmission lines, which are fed via line adapters 2a-2c to the digital switching network, are allocated to the telecommunications installation 1. If required, analog/digital conversion is carried out in the incoming direction and digital/analog conversion is carried out in the outgoing direction in the line adapters 2a-2c. The line adapters 2a-2c may be connected, e.g. via PCM transmission lines having in particular 64 channels, to the digital switching network 4. For the sake of simplicity, a plurality of subscriber lines 3 are shown in Figure 1 for the line adapter 2a only, wherein these subscriber lines may be allocated to both analog and digital subscriber terminal devices or further network nodes. The line adapters 2b and 2c are of course also connected in each case to a multiplicity of subscriber lines 3.

The telecommunications installation 1 is program-controlled. This is done with the aid of a controller 5, which receives the connection requests of the subscribers of the telecommunications installation 1, carries out the routing and controls the entire telecommunications installation 1, in particular the hardware of the telecommunications installation. As explained in more detail below, the telecommunications installation 1 is controlled in particular according to the application program system (APS), which is implemented on the telecommunications installation 1.

In the example shown in Figure 1, the function of the controller 5 is divided up into two halves, which run on two separate computer systems. One computer system, referred to as PCE, is used for administrative control of the telecommunications installation 1, in such a way that the application program system (APS) essentially runs on this computer system. The second computer system, referred to as GPE, is used primarily to control the actual switching

system, i.e. in particular the digital switching network 4, of the telecommunications installation

1. In contrast to the computer system PCE, the computer system GPE is therefore more hardware-oriented and supports the switching system processes. Both computer systems PCE and GPE are provided in duplicate for security, in order to prevent the entire telecommunications installation 1 from crashing if one computer of the relevant computer system fails. According to the embodiment shown in Figure 1, the computer system PCE therefore comprises two control units PCEU0 and PCEU1, which are formed by the control computers 6a and 6b shown in Figure 1. The computer system GPE analogously comprises two control units GPEU0 and GPEU1, which are formed by the control computers 6c and 6d shown in Figure 1. Within the individual computer systems PCE and GPE, one control computer can therefore in each case perform the function of the other control computer if the latter fails, in which case one control computer is operated in an active mode and the other control computer is operated in a standby mode. As explained in more detail below, the computer system PCE provides not only operating functions but also nonvolatile memory media of the telecommunications installation 1 and performs central control functions. The computer system GPE on the other hand has no secondary memories and performs the real-time control functions for the peripherals and for the switching network 4 of the telecommunications installation 1.

Figure 2 shows details of the configuration of the controller 5 shown in Figure 1.

The control units PCEU0 and PCEU1 can be implemented by means of normal personal computers 6a and 6b. A mouse 10a and 10b and/or a keyboard 11a and 11b are available as input media. Hard disks 7a and 7b, disk drives 13a and 13b and/or streamer drives 9a and 9b can be provided in each case as secondary memories. Furthermore, a CD-ROM drive 8a and 8b is in each case provided to enter, i.e. load, software. A monitor 12a

and 12b

is connected to each control computer 6a, 6b, and a printer 14a and 14b, respectively, is additionally allocated to each control computer.

The two partner control computers 6a, 6b are, for example, interconnected via an Ethernet connection 17. The two control computers 6a and 6b can furthermore be connected via the Ethernet connection 17 to a service multiplexer, via which, for example, lines can be connected according to the E1 transmission standard of the relevant telecommunications installation 1. In the embodiment shown in Figure 2, a V.24 connection 16, which serves to locate faults in the event of possible failure of the Ethernet line 17, is routed in parallel with the Ethernet connection line 17.

In order to be able to communicate, inter alia, with remote workstations, each control computer 6a, 6b has connections 18a and 18b, which are designed in particular in the form of an X.25 connection and are implemented with the aid of a dedicated plug-in card. In addition, interface cards 21a, 21b are provided, via which the control units PCEU0 and PCEU1 can be connected with the aid of corresponding connections 22a and 22b to the control units GPEU0 and GPEU1, which are implemented by the aforementioned control computers 6c and 6d.

Finally, for synchronization, a remotely controlled clock 15 is also provided, which is preferably connected via V.24 interfaces to the two control computers 6a, 6b. However, a radio clock 15 of this type is provided only in telecommunications installations which are designed as central units.

Finally, the control units GPEU0 and GPEU1 implemented by means of the control computers 6c, 6d are connected to the switching network 4 shown in Figure 1 and the peripherals of the telecommunications installation 1, and furthermore have

connections to output fault messages. Furthermore, these two control computers 6c and 6d are interconnected via a link-channel 23 to exchange hardware status messages with one another.

UNIX can be used as the operating system on the control units PCEU0 and PCEU1, and also a user interface based on X-Windows and the OSF-Motif. The ORACLE relational database management system is preferably used for data organization.

As already mentioned, with the redundancy implemented by means of the control computers 6a and 6b, and 6c and 6d, only one of the control computers 6a and 6b, and 6c and 6d, is active, while the other of the relevant control systems PCE and GPE is in standby mode. Only a restricted, rather than the complete, command scope, for example configuration commands, is offered on the relevant standby control computer, in order to turn the standby computer into the active control unit.

When activated, the two control computers 6a and 6b of the computer system PCE control the telecommunications installation 1 in each case depending on the software of an activated application program system (APS) and the work data of an activated database. This will be explained in detail below with reference to the control computer 6a serving as the control unit PCEU0.

As shown in Figure 2, the control computer 6a accesses a specific data stock 24 which comprises the software for the application program system and the database. This data stock 24 is located in particular on the hard disk 7a of the control computer 6a. According to the present invention, the data stock 24 comprises a plurality of APS file systems and preferably also databases, in each case only one pair of APS file systems/databases being activated and the other pairs

being deactivated. According to the preferred exemplary embodiment shown in Figure 2, in particular two pairs of APS file systems/databases are set up, wherein one memory area 19 has the software for one APS file system APS1 and the work data for a database DB1, while another memory area 20 comprises the software for a further APS file system APS2 and the memory area for a further database DB2. The APS file system APS1, along with the database DB1, forms an associated pair, whereas the APS file system APS2, along with the database DB2, likewise forms a corresponding pair. Alternatively, situations are also possible in which the two APS file systems APS1 and APS2 interwork with the same database DB1 or DB2. This may arise in particular following an APS changeover without modifying the database functionality on economic and time-saving grounds.

The relevant active APS file system and the active database are set in each case in the control computer 6a by means of corresponding control information via a special mechanism in the event of a re-installation or changeover of the application program system or a changeover between different application program systems. It is then assumed that, in the exemplary embodiment shown in Figure 2, the APS file system APS1 is initially set as the active APS file system and the database DB1 is set as the active database.

With the aid of the configuration shown in Figure 2, a simple APS changeover can be carried out accordingly by deactivating the APS file system APS1 and by activating the other APS file system APS2. A simple database changeover can be correspondingly implemented by deactivating the database DB1 and by activating the database DB2. An APS changeover of this type is appropriate particularly in the event of operational disruption, if no correct control of the telecommunications installation 1 can be implemented

with the aid of the initially active APS file system APS1.

However, in the case of an APS changeover of this type, the computer 6a must temporarily assume an undo or pause setting in order to avoid an overlap of the active and passive positions of the individual APS file systems or databases.

During periods of little or no operation, a fallback position can be very simply created for the control computer 6a by copying the contents of the initially active memory area 19 into the passive memory area 20 in such a way that the passive APS file system APS2 corresponds to the active APS file system APS1 and the passive database DB2 corresponds to the active database DB1, in order to guarantee reliable control of the telecommunications installation in a possible emergency, even if the redundant PCE control computer 6b is unavailable, by changing over to the memory area 20 with the APS file system APS2 and the database DB2.

During the installation of an application program system, the application program system which is still active remains active. Only if a database changeover is required during installation is there a need for a temporary changeover to the passive database, in the example shown in Figure 2 to the database DB2, in order to initialize a new database there and start the data transfer.

In terms of an APS changeover, a distinction is made between different types of a changeover of this type. Thus, for example, only the APS file system may be affected by a changeover of the application program system, so that, in this case, only the currently active APS file system is shut down and the new APS file system needs to be started up. If, on the other hand, the database memory area is also affected, the old database must also be shut down and the new database started up. In addition, the entire control computer is fully rebooted. The GPE control computer may equally be affected by an APS changeover, so

that, in this case, the GPE control units GPEU0 and GPEU1 must also be re-initialized if required. In order to control these different cases of APS changeovers, a specific restore or recovery stage must be allocated to each APS changeover, and is stored in the control computer 6a in the form of corresponding control information. With the occurrence of an APS changeover, the control computer 6a can determine and apply the relevant recovery stage with the aid of this control information, in order to carry out the controller restoration as effectively as possible in this way. The redundancy requirements must essentially be observed here, i.e. the relevant APS file system/database pairing must match, the active control computer remains active and the control computer in standby mode must be shut down to prevent interference with the controller.

It is evident from the above description that, according to the present invention, only one APS file system/database pair is active. The other, initially passive, pair can be accessed, for example, via a fallback mechanism in the event of an emergency via the active application program system or, for example, in test system operation in the event of a test level changeover, via the application program system of the preceding test layer, in order to activate this APS file system/database pair.

In the exemplary embodiment shown in Figure 2, only two pairs of APS file systems/databases are set up. However, the present invention can of course be applied to more than two such pairs, in which case it must be guaranteed that only one of these pairs is activated and the other pairs are deactivated. Furthermore, the controller has been explained with reference to Figure 2 purely in terms of the control computer 6a, i.e. in terms of the PCEU0 control unit. However, the above description applies analogously to the redundant

control computer 6b also, i.e. the PCEU1 control unit, in which case a plurality of pairs of APS file systems/databases are likewise advantageously set up and only one of these pairs is activated.

With the aid of the present invention, the capacity of the hard disk of a control computer 6a, 6b can be effectively used in order to quickly carry out an APS changeover and switch over to a new APS. This is particularly advantageous in the event of a test level changeover in test system operation of the telecommunications installation 1. Furthermore, this is advantageous in the event of an emergency, in order to guarantee reliable control of the telecommunications installation by means of an APS changeover even if the redundant control computer is unavailable.

Claims

1. A telecommunications installation (1), with at least one control computer (6a, 6b) to control the telecommunications installation (1), in which the control computer (6a, 6b) has memory means (7a, 7b, 24) to store control software (APS1, APS2) and work data (DB1, DB2), characterized in that the memory means (7a, 7b, 24) comprise a plurality of memory areas (19, 20), specific control software (APS1, APS2) being allocated to each memory area (19, 20), and in that the control software (APS1, APS2) of one of these memory areas (19, 20) is declared to be active and the control software of the other memory areas is declared to be passive, so that the control computer (6a, 6b) controls the telecommunications installation (1) according to the active control software (APS1, APS2).

2. The telecommunications installation as claimed in claim 1, characterized in that specific work data (DB1, DB2), which are stored by the memory means (7a, 7b, 24), are allocated to each control software package (APS1, APS2), the work data (DB1, DB2) allocated to the active control software (APS1, APS2) are declared to be active and the other work data are declared to be passive, so that the control computer (6a, 6b) controls the telecommunications installation (1) according to the active control software (APS1, APS2) and the active work data (DB1, DB2).

3. The telecommunications installation as claimed in claim 2, characterized in that

the memory means (7a, 7b, 24) comprise two memory areas (19, 20) to which specific control software (APS1, APS2) and specific work data (DB1, DB2) are in each case allocated.

4. The telecommunications installation as claimed in claim 3,
characterized in that
the two memory areas (19, 20) comprise the same control software and the same work data, wherein, in the event of a fault during the control of the telecommunications installation (1), the control computer (6a, 6b) switches over to and activates the previously passive control software and the previously passive work data and deactivates the previously active control software and the previously active work data, in order to subsequently control the telecommunications installations according to the newly activated control software and the newly activated work data.

5. The telecommunications installation as claimed in claim 4,
characterized in that,
in the event of a fault during the control of the telecommunications installation (1), and by means of a menu-driven operating intervention, the control computer (6a, 6b) switches over to and activates the previously passive control software and the previously passive work data and deactivates the previously active control software and the previously active work data.

6. The telecommunications installation as claimed in claim 4 or 5,
characterized in that,
in the event of a fault during the control of the telecommunications installation (1), the control computer (6a, 6b) temporarily transfers to a pause condition before switching over to the previously passive control software and the previously passive work data.

7. The telecommunications installation as claimed in

one of claims 3-6,
characterized in that,
during re-installation of control software (APS1, APS2), the control computer (6a) continues to control the telecommunications installation (1) according to the active control software.

8. The telecommunications installation as claimed in one of claims 3-7,

characterized in that,

during re-installation of work data, the control computer (6a, 6b) temporarily switches to the passive memory area (19, 20), in order to install a new work database therein.

9. The telecommunications installation as claimed in one of claims 3-8,

characterized in that,

during a changeover from the active memory area (19) and the corresponding control software (APS1) and the corresponding work data (DB1) to the other memory area (20) and the corresponding control software (APS2) and the corresponding work data (DB2), the control computer (6a, 6b) evaluates, with reference to stored control information, whether only the control software or else the work data or else a further control computer (6c, 6d) are affected by this changeover and, depending on this evaluation, automatically initiates the restoration of the telecommunications installation (1).

10. The telecommunications installation as claimed in one of claims 2-9,

characterized in that

the control computer (6a, 6b) comprises input means (10a, 11a, 10b, 11b) to enter control information which declares the control software (APS1, APS2) and the work data (DB1, DB2) of the individual memory areas (19, 20) of the memory means (7a, 7b, 24) to be either active or passive.

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Abstract

Telecommunications installation

Telecommunications installation (1), which is controlled with the aid of at least one control computer (6a, 6b), in which the control computer (6a, 6b) stores control software (APS1, APS2) and work data (DB1, DB2) for controlling the telecommunications installation (1). A plurality of pairs of control software and work data (APSi; DBi) are set up, wherein only one of these pairs is set to be active and the other pairs are set to be passive for controlling the telecommunications installation.

(Figure 2)

FIG 1

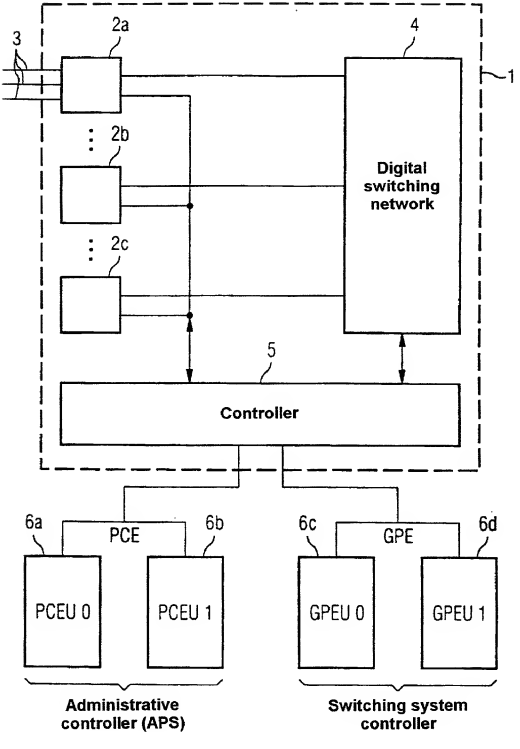
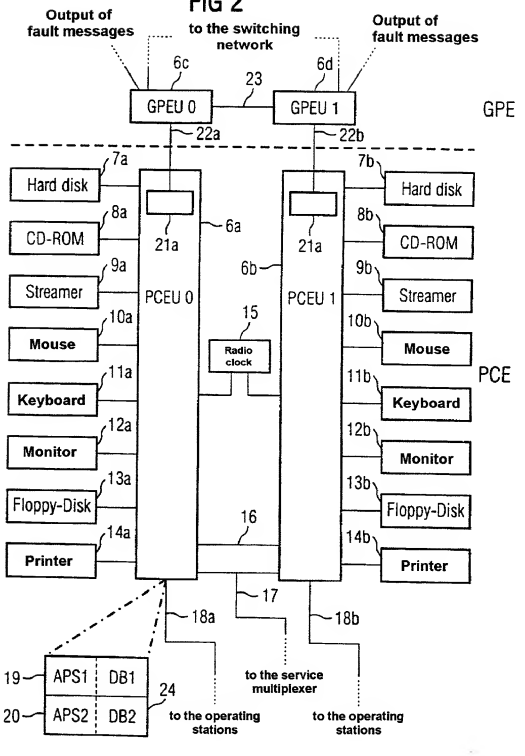

3
2a
4
1
2b
Digital switching network
2c
5
Controller
6a
PCE
6b
6c
GPE
6d
PCEU 0
PCEU 1
GPEU 0
GPEU 1
Administrative controller (APS)
Switching system controller

FIG 2



Declaration and Power of Attorney For Patent Application
Erklärung Für Patentanmeldungen Mit Vollmacht
German Language Declaration

Als nachstehend benannter Erfinder erkläre ich hiermit an Eides Statt:

As a below named inventor, I hereby declare that:

dass mein Wohnsitz, meine Postanschrift, und meine Staatsangehörigkeit den im Nachstehenden nach meinem Namen aufgeführten Angaben entsprechen,

My residence, post office address and citizenship are as stated below next to my name,

dass ich, nach bestem Wissen der ursprüngliche, erste und alleinige Erfinder (falls nachstehend nur ein Name angegeben ist) oder ein ursprünglicher, erster und Miterfinder (falls nachstehend mehrere Namen aufgeführt sind) des Gegenstandes bin, für den dieser Antrag gestellt wird und für den ein Patent beantragt wird für die Erfindung mit dem Titel:

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

Telekommunikationsanlage

deren Beschreibung

the specification of which

(zutreffendes ankreuzen)

☒ hier beigefügt ist.

☐ am _____ als PCT internationale Anmeldung PCT Anmeldungsnummer _____ eingereicht wurde und am _____ abgeändert wurde (falls tatsächlich abgeändert).

(check one)

☐ is attached hereto.

☐ was filed on _____ as PCT international application PCT Application No. _____ and was amended on _____ (if applicable)

Ich bestätige hiermit, dass ich den Inhalt der obigen Patentanmeldung einschliesslich der Ansprüche durchgesehen und verstanden habe, die eventuell durch einen Zusatzantrag wie oben erwähnt abgeändert wurde.

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims as amended by any amendment referred to above.

Ich erkenne meine Pflicht zur Offenbarung irgendwelcher Informationen, die für die Prüfung der vorliegenden Anmeldung in Einklang mit Absatz 37, Bundesgesetzbuch, Paragraph 1.56(a) von Wichtigkeit sind, an.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, §1.56(a).

Ich beanspruche hiermit ausländische Prioritätsvorteile gemäss Abschnitt 35 der Zivilprozessordnung der Vereinigten Staaten, Paragraph 119 aller unten angegebenen Auslandsanmeldungen für ein Patent oder eine Erfindersurkunde, und habe auch alle Auslandsanmeldungen für ein Patent oder eine Erfindersurkunde nachstehend gekennzeichnet, die ein Anmeldedatum haben, das vor dem Anmeldedatum der Anmeldung liegt, für die Priorität beansprucht wird.

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

German Language Declaration

Prior foreign applications
Priorität beansprucht

			Priority Claimed	
198 39 634.1	Germany	31. August 1998	☒	☐
(Number) (Nummer)	(Country) (Land)	(Day Month Year Filed) (Tag Monat Jahr eingereicht)	Yes Ja	No Nein
			☐	☐
(Number) (Nummer)	(Country) (Land)	(Day Month Year Filed) (Tag Monat Jahr eingereicht)	Yes Ja	No Nein
			☐	☐
(Number) (Nummer)	(Country) (Land)	(Day Month Year Filed) (Tag Monat Jahr eingereicht)	Yes Ja	No Nein

Ich beanspruche hiermit gemäss Absatz 35 der Zivilprozessordnung der Vereinigten Staaten, Paragraph 120, den Vorzug aller unten aufgeführten Anmeldungen und falls der Gegenstand aus jedem Anspruch dieser Anmeldung nicht in einer früheren amerikanischen Patentanmeldung laut dem ersten Paragraphen des Absatzes 35 der Zivilprozeßordnung der Vereinigten Staaten, Paragraph 122 offenbart ist, erkenne ich gemäss Absatz 37, Bundesgesetzbuch, Paragraph 1.56(a) meine Pflicht zur Offenbarung von Informationen an, die zwischen dem Anmeldedatum der früheren Anmeldung und dem nationalen oder PCT internationalen Anmeldedatum dieser Anmeldung bekannt geworden sind.

I hereby claim the benefit under Title 35. United States Code. §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §122, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56(a) which occured between the filing date of the prior application and the national or PCT international filing date of this application.

(Application Serial No.) (Anmeldeseriennummer)	(Filing Date) (Anmeldedatum)	(Status) (patentiert, anhängig, aufgegeben)	(Status) (patented, pending, abandoned)
(Application Serial No.) (Anmeldeseriennummer)	(Filing Date) (Anmeldedatum)	(Status) (patentiert, anhängig, aufgeben)	(Status) (patented, pending, abandoned)

Ich erkläre hiermit, dass alle von mir in der vorliegenden Erklärung gemachten Angaben nach meinem besten Wissen und Gewissen der vollen Wahrheit entsprechen, und dass ich diese eidesstattliche Erklärung in Kenntnis dessen abgebe, dass wissentlich und vorsätzlich falsche Angaben gemäss Paragraph 1001, Absatz 18 der Zivilprozessordnung der Vereinigten Staaten von Amerika mit Geldstrafe belegt und/oder Gefängnis bestraft werden koennen, und dass derartig wissentlich und vorsätzlich falsche Angaben die Gültigkeit der vorliegenden Patentanmeldung oder eines darauf erteilten Patentes gefährden können.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

German Language Declaration

VERTRETUNGSVOLLMACHT: Als benannter Erfinder beauftrage ich hiermit den nachstehend benannten Patentanwalt (oder die nachstehend benannten Patentanwälte) und/oder Patent-Agenten mit der Verfolgung der vorliegenden Patentanmeldung sowie mit der Abwicklung aller damit verbundenen Geschäfte vor dem Patent- und Warenzeichenamt: *(Name und Registrationsnummer anführen)*

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. *(list name and registration number)*

And I hereby appoint

Messrs. John D. Simpson (Registration No. 19,842) Lewis T. Steadman (17,074), William C. Stueber (16,453), P. Phillips Connor (19,259), Dennis A. Gross (24,410), Marvin Moody (16,549), Steven H. Noll (28,982), Brett A. Valiquet (27,841), Thomas I. Ross (29,275), Kevin W. Guynn (29,927), Edward A. Lehmann (22,312), James D. Hobart (24,149), Robert M. Barrett (30,142), James Van Santen (16,584), J. Arthur Gross (13,615), Richard J. Schwarz (13,472) and Melvin A. Robinson (31,870), David R. Metzger (32,919), John R. Garrett (27,888) all members of the firm of Hill, Steadman & Simpson, A Professional Corporation.

Telefongespräche bitte richten an: *(Name und Telefonnummer)*

Direct Telephone Calls to: *(name and telephone number)*

312/876-0200
Ext. _____

Postanschrift:

Send Correspondence to:

HILL, STEADMAN & SIMPSON
A Professional Corporation
85th Floor Sears Tower, Chicago, Illinois 60606

Voller Name des einzigen oder ursprünglichen Erfinders:	Full name of sole or first inventor:
ENDRES, Rüdiger	
Unterschrift des Erfinders — Datum: Rüdiger Endres 20.9.99	Inventor's signature — Date
Wohnsitz: D-81379 München, Germany	Residence
Staatsangehörigkeit: Bundesrepublik Deutschland	Citizenship
Postanschrift: Boschetsrieder Str. 63 D-81379 München Bundesrepublik Deutschland	Post Office Addess
Voller Name des zweiten Miterfinders (falls zutreffend):	Full name of second joint inventor, if any:
Unterschrift des Erfinders — Datum	Second Inventor's signature — Date
Wohnsitz	Residence
Staatsangehörigkeit	Citizenship
Postanschrift	Post Office Address

(Bitte entsprechende Informationen und Unterschriften im Falle von dritten und weiteren Miterfindern angeben).

(Supply similar information and signature for third and subsequent joint inventors).

BOX PCT
IN THE UNITED STATES DESIGNATED/ELECTED OFFICE
OF THE UNITED STATES PATENT AND TRADEMARK OFFICE
UNDER THE PATENT COOPERATION TREATY--CHAPTER II

APPOINTMENT OF ASSOCIATE POWER OF ATTORNEY

APPLICANT(S):	RÜDIGER ENDRES
ATTORNEY DOCKET NO.:	P01,0025
INTERNATIONAL APPLICATION NO:	PCT/DE99/02651
INTERNATIONAL FILING DATE:	24 AUGUST 1999
INVENTION:	TELECOMMUNICATIONS INSTALLATION

Assistant Commissioner for Patents,
Washington D.C. 20231

Dear Sir:

I am an attorney designated on the Power of Attorney for the above-referenced application. I hereby appoint Mark Bergner (Reg. No. 45,877) as an associate attorney, with full power of substitution and revocation, to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith.

Submitted by,

(Reg. No. 31,870)
Melvin A. Robinson
SCHIFF HARDIN & WAITE
PATENT DEPARTMENT
6600 Sears Tower
Chicago, Illinois 60606-6473
(312) 258-5785
Attorney for Applicant(s)

CUSTOMER NUMBER 26574